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learned by a study of the figures (Plate IV.) with the accompanying explanations. We could now pass on to the subject of fertilization did we not have connected with this phenomena another series of phenomena that can be understood only by reference to the facts of "cell division," to which we next direct our attention.

(To be continued.)

DESCRIPTION OF A NEW SPECIES OF DIPODOMYS, WITH SOME ACCOUNT OF ITS HABITS.

BY F. STEPHENS.

Dipodomys deserti STEPHENS, n. s. Desert Pocket-Rat.

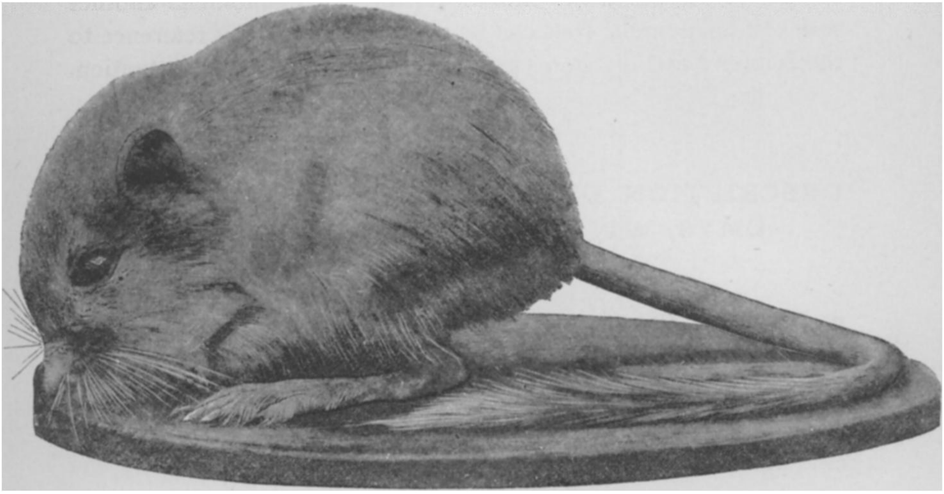
LARGEST known species of the genus. Length, head and body, 5.2 inches; tail vertebræ, 7.7 inches; hind foot, including claw, 1.9 inches. Color above pale yellowish brown, fur plumbeous at base, showing through the tips enough to give an ashy tinge. Below, white. Fore legs from elbow, and hind legs, in front, from knee, white. Tail, at base, on sides, below, and the tip, white; above, pale brown, becoming plumbeous towards the white tip. Indistinct white spot over the eye, another behind the ear, which extends across the shoulder to the white underparts. Indistinct white band across the hips. Indistinct darker spot at base of whiskers. Soles of hind feet nearly white. Type No. 314. Female, June 29, 1886. Mojave River, Cal. Deposited in the National Museum.

Habitat, Mojave and Colorado Desert regions of Southeastern California.

COMPARISON OF THE SPECIES.

Dipodomys deserti.	*Dipodomys phillipsi.*
Size large.	Size small.
Color pale, markings comparatively indistinct.	Color dark, markings distinct.
Eyes moderately large.	Eyes very large.
Soles of hind feet white in the young, indistinctly brownish in the adults, perhaps due to soiling.	Soles of feet dark brown (same color as upper surface of tail).
Spot at base of whiskers merely darker than surrounding parts.	Spot at base of whiskers nearly black.
Mastoid region enormously inflated.	Mastoid region comparatively moderately inflated.

PLATE V.



Dipodomys deserti Stephens. Desert Pocket Rat. Three-fourths natural size.
From photograph from life.

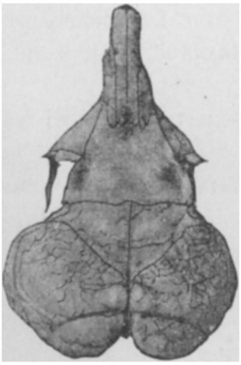


FIG. 1.—Skull of *Dipodomys deserti.*

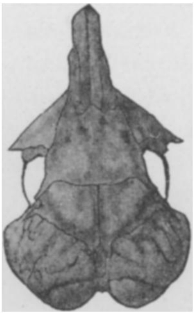


FIG. 2.—Skull of *Dipodomys phillipsi.*

Natural size.

The proportions of the two species are much the same. There are other points of difference in the skull, but this is sufficient to show their specific distinctness.

D. phillipsi ordi, being a slightly larger, rufous-tinged variety of *D. phillipsi*, may be considered as being classed with the latter in the above comparison.

The type specimen may be below the average size. I have a male that measured (fresh) 5.8 inches head and body, 8.2 inches tail vertebræ. Total number of specimens examined is nine. The photographs of skulls are natural size; of the animal, three-fourths natural size.

The last three days of June, 1886, I camped near the Mojave River on my way home from a collecting trip along the desert side of the San Bernardino Mountains. The first morning there (June 29) I found two peculiar *Dipodomys* in traps I had set the previous evening. They seemed to be a pale variety of *D. phillipsi*, such as I knew to be liable to occur there, it being the rule that most birds and mammals inhabiting the Mojave and Colorado Deserts are paler in color than others of the same species found in the moister coast region. In another trap was an ungrown *D. phillipsi* of nearly normal color, but I laid its darker color to its evident immature condition. At sunset I again put out my traps, and, as there were more inhabited burrows than I had traps for, I put out poisoned wheat also, which proved a most unwise act. This poisoned wheat is widely used in California to destroy ground-squirrels, pocket-rats, and similar pests. When it is used, some of the poisoned animals come to the surface to die, and I expected to obtain some additional specimens by its use. The next morning I had one *D. phillipsi* and two of the pale variety in my traps, and I found one of each phase of coloration poisoned, and, later in the day, when the hot sun had spoiled it, I found another pale one. Nearly all the poisoned wheat had been taken. These additional specimens convinced me that the pale animals were a good species.

I had intended driving on in the afternoon, but I concluded to stop another night to try for more. The poisoned wheat had done its work only too well, for my traps contained no pocket-rats the next morning, and but few burrows showed signs of occupancy. I was unable to revisit the region until the next November, when I followed the Mojave River for twenty-five miles from where it leaves the mountains, but succeeded in finding no more colonies, though several miners whom I met knew the animal, and thought they were not rare. From the colony found in June I obtained three *D. phillipsi* and three more of the new species, which I have named *Dipodomys deserti*. As the river was now dry in this part of its course, I was able to spend but two nights at the place. The colony appeared to be nearly deserted, but I do not think I obtained them all. I brought two animals of each species home alive, and still have them in captivity. On my way home I camped one night in the Cajon Pass, at an altitude of about three thousand five hundred feet. The night was very cold for this region, ice forming in my canteen and coffee-pot. The *D. deserti* suffered badly. I had not expected so severe a night, and had given them no protection more than to turn the open side of the box (which was covered with wire netting) to another box. At sunrise I noticed that one of the *D. deserti* seemed uneasy, and a closer inspection showed that its tail was frozen as stiff as a stick. In turning about in its narrow quarters it had broken off about two inches of the tail, the piece lying on the floor. The other *D. deserti* had not suffered so much, but it ultimately lost most of the terminal white tuft. The *D. phillipsi* seemed none the worse for the frost, and probably are a hardier race, which may account for their wider distribution.

The following notes on habits are based mainly on observations of my captives. The *D. deserti* especially have become very interesting pets, and allow handling freely. I often turn them loose in a room of my house, usually but one at a time, as they are somewhat quarrelsome, especially the one with the frosted tail, the accident having made it somewhat bad-tempered. It is quite pugnacious, driving the others about so that they often return to their cages. The *D. phillipsi* do not pay much attention to the peaceable *D. deserti*, but when the other comes near they promptly leap away. When the two species were first turned loose together they had an all-round fight, but the riot did not last long, the heavier *D. deserti* being easily victorious. The actions of both species in fighting are much alike. When both are disposed to stand their ground they stand nearly erect, facing one another, and apparently cuff and scratch with the fore feet, the motions being too quick to follow accurately with the eye. A few passes and one or the other loses its balance and leaps away, followed a short distance by the other. I have been unable to detect any use of the teeth in such face-to-face encounters. Sometimes the larger *D. deserti* will happen near one of the others and slowly and slyly work closer, and suddenly pounce on the other, when I have heard a squeak of pain as if the teeth had been used. The bite cannot be severe, for the mouth is not capable of opening widely, and the upper incisors slope inward so much that they can get but a shallow hold. I have not handled the *D. phillipsi* much, but they have never bitten me. I handle the *D. deserti* often; one has never bitten me, the other but once, when I attempted to hold it against its wishes. It bit the inside of my forefinger where the skin was thick, and though the teeth met, but a drop or two of blood flowed. The punctures made by the upper and under incisors were but five-thirty-seconds of an inch apart, and I believe it was about as hard a bite as the beast was able to inflict on so comparatively flat a surface. Of course they are capable of cutting a twig or similar hard substance of small size. They have not so far attempted to bite the tail of another, which is the favorite mode of attack of their relatives, the tuft-tailed pocket-mice (*Perognathus penicillatus*). Locomotion is similar with both species, but *D. phillipsi* is more agile, leaping farther and quicker. This species can reach to about eighteen inches from the floor in trying to escape from the room, the leap taking place from near the foot of the wall. I think the usual horizontal leap when running rapidly is three feet or more, which is considerably more than that of *D. deserti.* The gait might be termed a hop, the work being mostly done with the hinder limbs. When moving about slowly, the first movement seems to be a tap on the ground with the fore feet to raise the fore part of the body to a leaping position, when the powerful hinder limbs give a spring resulting in a leap of a few inches. When they are running rapidly one cannot see just how it is done, but I often thought that the fore limbs take little or no part in the action, which seems to be aided by the long tail, both in guiding and balancing. It certainly looks as if the animal would be in danger of running its nose in the ground and "ending over" if it depended on its very short fore legs to raise its body into leaping position after each quick leap, for *D. phillipsi* at least can get over the ground at a pace that would put a cat to nearly its best speed to overtake it. I once saw a *D. phillipsi* run some forty or fifty yards in broad daylight, and have often seen them skurry away from camp in the moonlight when I happened to alarm them by some movement.

In places where much camping is done, such as by springs on the principal roads from one mining camp to another, the pocket-rats are in the habit of coming about the wagons at night to pick up the grain scattered by the horses, etc., becoming comparatively tame, as no one harms them. I never knew a dog to catch one, for they can get under way very quickly, and in such places they have many holes, perhaps for such emergencies, and they immediately vanish in the nearest. In feeding they often rise to a more or less erect posture, apparently to get a better view of their surroundings. In the house I have seen them stand erect on the tail and the toes of the hind feet, thus forming a secure tripod; at such times they walk about several steps, sidewise as well as forward, with as much ease as a man.

D. phillipsi is the shyest; they dislike to be handled, and do not often come near me when out in the room. *D. deserti* does not seem to dislike handling, but they will not yet come to me when called, though when running about the room they pay no attention to me, running across my feet, etc. Sometimes when I come in the room they will presently come quite close to me, apparently from a mild curiosity to see what I am doing. They appear to be almost devoid of fear of other animals. The first time I put the cat in the room they came to the front, putting their noses against the wire netting to look at the cat, which was greatly vexed that she could not get at them. In this instance the *D. phillipsi* remained at the back of their cages.

So far none of my captives will drink water. They will eat of vegetables, such as sweet potatoes, the leaves of beets and cabbages. It is probable that they obtain sufficient moisture from such sources. The principal food seems to be seed and grain. They consume but little more than a heaping tablespoonful each of wheat or barley in twenty-four hours, and one or two square inches of beet or cabbage leaves, so they are not heavy eaters. For the first two or three days I had them they probably ate double this amount, but as they had been on short allowance for some weeks they were more than usually hungry. The seeds on which they depend in a state of nature had been ripe some months and naturally were pretty well gathered in, but this colony had depended considerably on the waste of the travellers who usually camped in the immediate vicinity. The travel had ceased in July when the stream dried up, and thus compelled the use of a longer route until the winter rains should start the stream running again. This hunger may have caused them to tame quicker. I heard the trap-door fall when the first one was caught, and immediately took it out and put it in a cage and gave it grain. It was amusing to see the eagerness with which it immediately went to filling its pockets. It stuffed them so full that it must have been positively painful, and then it would not stop to eat, but hunted about for some exit; not finding one, it ejected the contents of its pockets in a corner out of the firelight and went back for more. This time it ate a little, but soon gathered the remainder and deposited it with the first. After eating a little more, it refilled its pockets and hunted about for a better place to make a *cache*, seeming to think its first choice insecure. These actions plainly show that they are in the habit of storing away their surplus. In grain-fields infested by *D. phillipsi*, the plough will often turn up a deposit of a pint or so when the field is ploughed for re-seeding. The loss to farmers is thus quite considerable at times.

Having watched them repeatedly, I can say positively that the pockets are filled with the fore feet used as hands. When placed at a pile of grain, when hungry, they fill the pockets very quickly, both pockets being filled alike. The two pockets of *D. deserti* will hold a heaping tablespoonful of grain, and are, therefore, capable of carrying nearly a full day's supplies. The filling is done so rapidly that, where a hard grain like wheat is used, a continuous rattling sound is made. The ejecting of the grain from the pockets is aided by a forward, squeezing motion of the fore feet, each foot making two or three quick forward passes occupying scarcely a second of time. For the first few days all grain put in the cages was immediately pocketed, but since then they rarely fill their pockets, seeming to have found its uselessness.

The position at rest is a curious one. At first the animal stands on all four feet, with the entire sole of the hind feet resting on the ground, some of the weight coming on the fore feet; presently the hind feet will hitch forward until the centre of the hind feet comes under the centre of gravity, thus taking all the weight; then, often, the fore part of the body will be slightly raised and the fore feet drawn up against the body. If disposed to sleep, the bright eyes will slowly close, the fore feet droop until touching the ground, the nose slowly comes down and backward until resting between the toes of the hind feet, and the now sleeping animal is nearly as round as a ball. This appears to be the common sleeping posture. If there be room, the tail will be extended back nearly in a straight line, but in cramped quarters it will be curved to one side or even alongside the body; but in either case the basal part will be curved back enough to give some support. These animals make much use of the tail, and its loss would be a great inconvenience. When one of my *D. deserti* lost the use of its tail temporarily through its being frozen, I saw it fall over several times, lacking its accustomed support.

I do not see them make much use of the power of scent, but the long whiskers are very sensitive, and must be of much use in their nocturnal rambles. The sight is good in daylight, though they do not like a strong light. If compelled to rest in a light place, they face away from the light if possible. Both species of *Dipodomys* seldom emerge from their burrows until the evening light gets dim. The hearing does not seem to be unusually acute, but I have made no experiments yet to positively determine the fact.

Phillips's pocket-rat does not seem to live in companies, though the holes of different individuals may be but a few yards apart. From such information as I can gather, and from what I have seen myself, I think that the desert pocket-rat lives in colonies often if not usually. The only place where I have taken *D. deserti* has a colony of several groups of holes, each group being from two to eight entrances to a set of intercommunicating galleries, from six to thirty inches below the surface, and being within a space of two to three yards square. None that I opened proved to be inhabited. In each several galleries terminated one to two feet from the surface in a slight enlargement, which generally contained the hulls of barley, etc., as if they were used as places of storage. Two contained a little dry grass, as if they had been used as nests. I put paper and cotton in the cages, but the *D. deserti* made but little use of it. The *D. phillipsi*, however, made a rude nest of theirs. After I had the animals a few days I gave them a little dry earth. The *D. deserti*, especially, were pleased with it, rolling in it, pushing along on their bellies, and enjoying a good dust-bath. They looked much better for it, the pelage, which had been rough, becoming smooth and glossy.

I think they must sometimes eat insects, as I saw one, when hopping about the floor, come across a cricket, which it appeared to leap upon, and, as I could find nothing more of the cricket, I think the pocket-rat must have eaten it.

None of the females that I obtained contained embryos, but I have a skin of a *D. deserti* some four or five weeks old, killed with a whip by a teamster near Seven Palms, on the Colorado Desert, April 1, 1886. A friend has two young *D. phillipsi* in alcohol, taken in October, which were some five or six weeks old when taken.

I think *D. deserti* will prove to be commonly distributed over most of the Mojave and Colorado Deserts west of the Colorado River, and possibly they may occur in Arizona and Mexico.

HISTORY OF GARDEN VEGETABLES.

BY E. LEWIS STURTEVANT, A.M., M.D.[1]

THIS series of articles, which should be rather entitled notes on than history of cultivated vegetables, is intended as a portion of a study into the extent of variation that has been produced in plants through cultivation. The author has had the great advantage of opportunity of studying the growing specimens in nearly all the species named, and in nearly all the varieties now known to our seed trade; and this study has given him confidence in the establishing of synonymy, as oftentimes the variables within types have furnished clues of importance. The treatment, as a matter of convenience, is arranged alphabetically, and includes the species recognized by Vilmorin-Andrieux in their standard work "Les Plantes Potagères," 1883, and the English edition "The Vegetable Garden," 1885, with the exception of the

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[1] Director of the New York Agricultural Experiment Station, Geneva.